

Competences Assessment on Construction Companies in Respect to EDCF

Hwa Rang Kim, Do Yeob Kim and Hyoun Seung Jang

School of Architecture, Seoul National University of Science and Technology, Seoul, Korea

Abstract: Korea's overseas construction contract value has declined due to the changes in the global construction market. As such, Korean construction companies are increasingly utilizing concessional loan in order to enter the overseas market. Also, EDCF funding by the Korean government is also consistently increasing. Furthermore, corporate participation in the related project is projected to rise as a result of increased financial support for economic/social infrastructure facilities to achieve SDGs. In this study, advice on acquiring competency in entering the global market through EDCF program for Korean construction companies is suggested based on research data. Literature review and Focus Group Interview (FGI) targeting relevant professionals were used to derive 49 core competencies for the EDCF program. After surveying EDCF professionals based on the derived competencies, Importance Performance Analysis (IPA) and GAP analysis were applied to the surveyed data. Highly assessed competencies were construction quality control, relationship building through high-level diplomatic activities and project management. Competencies requiring urgent improvement were handling risks of local countries, financing projects and developing know-how within participating companies.

Key words: Economic Development Cooperation Fund (EDCF), Official Development Assistance (ODA), Importance Performance Analysis (IPA), Focus Group Interview (FGI), relationship, competencies requiring

INTRODUCTION

Korea's overseas contract value was \$46.1 and \$28.1bn in 2015 and 2016, respectively where overseas contract value had decreased more than 30% for 2 consecutive years. Also, contract value was \$29.0 bn in 2017 in which the nation's overseas contract value recorded <\$30 bn for 2 consecutive years (Sohn, 2017; ICIS., 2018). "Decrease in international oil price, raised geopolitical risk, increased uncertainty in global financial markets and intensified contract competition between companies from developed and developing nations" were various contract type and regional factors that led to the decrease in overseas contract value. In order to cope with the environmental changes in the overseas construction market, increasing amount of Korean construction companies are participating in Official Development Assistance (ODA) overseas projects which are more stable. ODA is composed of grant and concessional loans. Korea's concessional loan business called EDCF (Economic Development Cooperation Fund) which was established in 1987 in order to encourage economic trade between Korea and developing nations. EDCF supports the economic development and industrialization of developing nations and many construction companies

seek for concessional loans (EDCF) to further finance economic/social infrastructure projects in developing nations. By the end of 2016, 375 projects across 54 nations accounting for approximately \$13.2 bn was funded by EDCF program. Also, 108 projects across 32 nations costed about \$5.4 bn of loan disbursements. EDCF commitments in 2016 was composed of transportation (4,893 USD million, 104 projects), water resource/ sanitation (2,271 USD million, 62 projects), energy (1,173 USD million, 36 projects), health (1,403 USD million, 48 projects) and communications (824 USD million, 33 projects) (EDCF., 2016).

EDCF commitment in 2017 was \$2 tn, an increase of \$400 bn from 2016. Korean construction companies are actively entering the overseas projects utilizing EDCF programs based on increased opportunity in participating projects by Korean construction companies due to increased financial aid and increased project security due to the guarantee by both Korean and recipient nation's government.

Also, among the 17 Sustainable Development Goals (SDGs) selected by the United Nation in 2015, clean water and sanitation, affordable and clean energy, industry/innovation and infrastructure and sustainable cities and communities categories are involved with

projects, it is possible to infer that the international community and Korean government will further increase support for the related projects. However, intensified competition with overseas nations (China, Japan, etc.) will be unavoidable regardless of the increased support by the Untied ODA from the Korean government. It will be essential for companies to identify methods to strengthen capabilities in order to gain competitive advantage against other overseas companies as well as to cope with the changes in the contract environment.

This research aims to provide insight on how to successfully execute an EDCF project by surveying and analyzing capabilities of construction companies and utilizing related experts in order to develop a questionnaire and to analyze the survey results.

Construction business through EDCF: Previous studies on construction business through EDCF considered structure, financing, policy and process as important. Song (2005) proposed that a Korean aid model that can boost exports, enhance the national image, secure export markets and resources and mutually benefit both EDCF and Korea should be established based on historical aid and the current aid environment of Korea. Choi (2007) suggested concessional official development assistance by the government for construction owners to be able to fund contractors when securing finance of overseas constructions. Choi (2012) cited many cases in which recipient countries had been harmed by projects that did not meet ODA purposes and examined how the ODA preference for Korean construction sector had actually influenced performance in recipient countries by citing the commuter railroad project of Metro Manila, Philippines. Other previous construction-related research included the scope of ODA, necessity of utilizing ODA to enter the overseas construction market and ODA funding. In this study while keeping continuity with previous studies, this research focuses on the specific methods in which deficiencies appeared in the course of actual market entry. To accomplish this, core competences for EDCF programs were identified through companies that had participated in the EDCF program as well as research institutes and academics who have conducted relevant studies. The identified information was utilized to determine the current competency levels of the companies and to present which competencies are required. This research will support Korean construction companies in entering the EDCF program and further help them acquire business competitiveness in the global development assistance program market.

MATERIALS AND METHODS

In order to achieve the objective of this study, a literature review and statistical analysis were conducted as shown in Fig. 1.

The core competencies for performance within EDCF program were extracted through literature review. In order to ensure objectivity in the selection of the core competencies, a Focus Group Interview (FGI) targeted on relevant experts with experience in the EDCF program was used to determine the required core competencies. Then, a questionnaire survey was used in order to conduct Importance Performance Analysis (IPA) and assess the importance of the previously derived core competencies and current competency levels.

Construction business through EDCF

Factors: In this study, the literature review and the FGI method were applied to collect information on core competencies to develop the questionnaire prior to the quantitative analysis. FGI is a method of interviewing a small group of people for a specific purpose. Generally, 6-10 people with similar backgrounds participate in the group and are interviewed for about 1-2 h (Patton, 2001). FGI is a method used during the important qualitative survey phase and is a technical and qualitative research method preferred by many marketing scholars (Malhotra, 1996). In this study, core competencies derived from literature review were consulted and evaluated twice by eight EDCF experts and a total of 49 core competency items were derived which included 18 items for the planning phase (Market Search, Financing, Global Network), 16 items for marketing phase (Owner Requirement, Culture, Scope of Work) and 15 items for Operating phase (Engineering, Construction, Operating and Maintenance) as listed in Table 1.

IPA: IPA (Importance-Performance Analysis) is an analysis frame proposed by Martilla and James (1977) for the marketing sector. IPA develops a conceptual structure of the multiple attributes model and compares and analyzes the relative importance and performance of each attribute simultaneously. Particularly, by simplifying satisfaction-related theories and schematizing the analysis results, IPA is advantageous in that even hands-on workers can easily identify the study results. Recently, IPA was utilized in other sectors such as education, internal marketing and tourism in order to identify company competency ranking in the market, determine

Table 1: Competencies for EDCF project

Project phase/Code	Competency items
Planning phase (A)	
A-1	Consistency with international assistance policy of Korea
A-2	The ability to obtain business information on target local country
A-3	The ability to relationship building with ordering country by high level diplomatic activities
A-4	The ability to form inter-governmental discussion channels
A-5	The ability to perform a field survey and rough feasibility study
A-6	The ability to organize a council to concentrate competences support order winning.
A-7	The ability to build an international human network
A-8	The ability to garner order winning support services from the embassy and diplomatic offices
A-9	The ability to obtain a specialized information supply and network between political means
A-10	An organizational link with government offices
A-11	Consistency with the economic and development plans of the recipient country
A-12	The ability to form the private and public cooperative system
A-13	Sales and information collecting capability
A-14	Abilities in business development and sales
A-15	Abilities in procedure and manual management
A-16	Project team leader competence
A-17	Feasibility and evaluation for profitability capabilities
A-18	The ability to identify project trend information, survey and plan
Marketing phase (B)	
B-1	Knowledge of export financing and insurance conditions
B-2	Development knowledge within the participating company
B-3	Public awareness of the participating company
B-4	The ability to handle risks of the local country
B-5	The ability to prepare bidding documents in English
B-6	Project financing capabilities
B-7	The ability of the participating company and Korean government to assess the ordering country
B-8	The ability to build human relationships and trust with persons charged with order placement
B-9	The ability to manage construction contract and claims
B-10	The ability to accept the contractor's requirements
B-11	Knowledge of currency exchange risk measures
B-12	The engineering/technical capabilities of the participating company
B-13	The ability to adapt to Foreign social culture
B-14	The ability to cope with various order placing methods of the contractor
B-15	An assessment of ethical aspects of the participating company
B-16	The existence of a cooperative relationship with the contractor
Operating phase (C)	
C-1	Compliance with regulatory guidelines of local government
C-2	Design and design management capabilities
C-3	Material procurement and material management capabilities
C-4	The ability to combine technologies and new construction methods
C-5	The ability to manage construction drawings, procedures and manuals
C-6	The company's technology retention capability
C-7	The level of subcontractor management
C-8	The ability to manage and train local labor
C-9	The ability to control quality for the work
C-10	Project management capabilities
C-11	Negotiation and claim handling capabilities
C-12	Work schedule management capabilities
C-13	Knowledge of the social and economic effects of the project
C-14	The ability to determine whether to establish a separate corporation for further operation
C-15	Warranty and after sales service capabilities

opportunities and derive strategic planning guidelines (Baloglu and Love, 2003; Janes and Wisnom, 2003; Hudson *et al.*, 2004; Tonge and Moore, 2007; Scholl *et al.*, 2006; Qu and Sit, 2007; Park, 2010; Kim, 2011). The four quadrants matrix helps organizations identify areas for improvement and actions for minimizing the gap between importance and performance (Fig. 2).

Quadrant 1 high priority competencies (concentrate here): Even though these are core competencies

recognized as very important in the course of project promotion, they are classified as competencies that requires improvement as soon as possible as the entity under study's competency level is low.

Quadrant 2 core competencies (keep up the good work): These are recognized as important attributes by core competencies in the course of project promotion. As the entity under study's competency level is very high as well, it is important to maintain the current level of core competency.

Table 2: Importance and current competence levels by competitive competence items

Phase/Code	Importance			Performance		
	Mean	Phase rank	Overall rank	Mean	Phase rank	Overall rank
Planning phase (A)						
A-1	5.67	3	8	4.61	2	10
A-2	5.62	8	15	4.50	3	12
A-3	5.67	3	8	5.00	1	3
A-4	5.67	3	8	4.48	6	16
A-5	5.71	2	7	4.50	3	12
A-6	5.05	16	39	4.19	8	24
A-7	5.17	12	32	4.13	12	33
A-8	4.83	17	44	3.83	16	40
A-9	5.12	15	38	4.15	11	32
A-10	5.67	3	8	4.08	13	34
A-11	5.67	3	8	4.17	9	25
A-12	5.17	12	32	4.00	14	35
A-13	5.50	9	16	4.00	14	35
A-14	5.50	9	16	3.83	16	40
A-15	4.67	18	48	3.83	16	40
A-16	5.83	1	2	4.39	7	19
A-17	5.17	12	32	4.50	3	12
A-18	5.33	11	24	4.17	9	25
Marketing phase (B)						
B-1	5.83	2	2	4.33	2	20
B-2	5.50	4	16	3.67	14	46
B-3	5.17	12	32	3.67	14	46
B-4	5.83	2	2	3.67	14	46
B-5	5.21	11	31	4.17	5	25
B-6	6.17	1	1	4.17	5	25
B-7	5.50	4	16	4.33	2	20
B-8	5.31	9	29	3.83	11	40
B-9	5.23	10	30	4.17	5	25
B-10	4.83	14	44	4.17	5	25
B-11	5.37	6	23	3.83	11	40
B-12	5.33	7	24	4.41	1	18
B-13	4.83	14	44	3.78	13	45
B-14	5.00	13	40	4.17	5	25
B-15	4.83	14	44	4.00	10	35
B-16	5.33	7	24	4.33	2	20
Operating phase (C)						
C-1	5.33	8	24	4.61	9	10
C-2	5.00	12	40	4.74	6	7
C-3	5.00	12	40	4.83	3	4
C-4	5.17	10	32	4.72	7	8
C-5	5.50	5	16	4.83	3	4
C-6	5.83	1	2	4.83	3	4
C-7	5.33	8	24	4.43	11	17
C-8	5.38	7	22	4.33	12	20
C-9	5.67	3	8	5.17	1	1
C-10	5.83	1	2	5.17	1	1
C-11	5.67	3	8	4.00	13	35
C-12	5.50	5	16	4.50	10	12
C-13	5.17	10	32	4.67	8	9
C-14	4.67	15	48	3.67	15	46
C-15	5.00	12	40	4.00	13	35

Quadrant 3 competencies requiring strengthening (low priority): These competencies are not recognized as important in the course of project promotion and the entity under study's competency level is low as well. The necessary strategy is to put limited resources toward the competencies in this quadrant.

Quadrant 4 potential core competencies (possible overkill): These competencies are recognized of low

importance in the course of project promotion. However, as they have properties that can elicit relatively high competencies, they are included in the potential core competencies.

IPA is conducted in the following order:

- Surveying which attributes the study subjects perceive as important
- Assessing the importance of all the attributes prior to experience

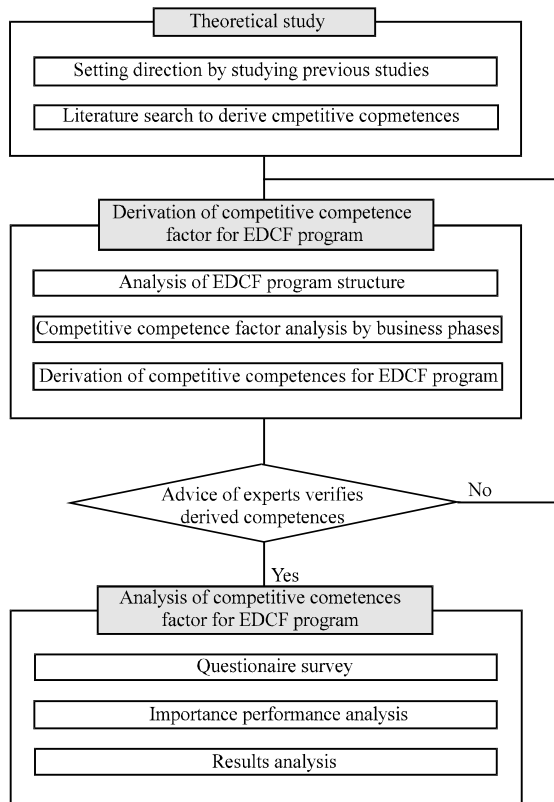


Fig. 1: Research flow chart

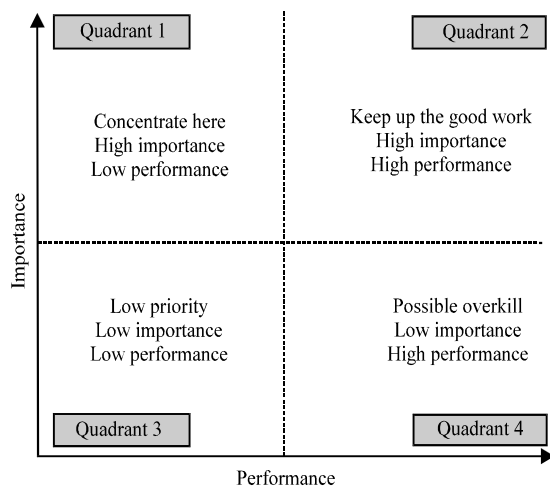


Fig. 2: The importance-performance analysis grid

- Allowing the users themselves to assess performance after experiencing
- Comparing and analyzing relative importance and performance of each attribute simultaneously (Hammitt *et al.*, 1996).

Survey: In this study, a questionnaire survey was conducted in order to identify the importance and current competency level of the core competency items related to the EDCF program entry. The questionnaire survey targeted experts related to EDCF program and 31 out of 50 subjects responded (62% response rate). The largest group of respondents (21) were related to research institutes or academic field and 10 respondents were corporate employees. A majority of respondents (80.6%) had more than 5 years of experience related to ODA or EDCF program who were considered appropriate questionnaire respondents for assessing core competencies related to EDCF program entry. The questionnaire included a survey on the importance and current competency level for core competencies derived using FGI. Itemized importance and current competency level for core competencies that were analyzed through the questionnaire are listed in Table 2. Next, core competencies necessary for Korean construction companies were analyzed and prioritized based on the results obtained from the questionnaire which quantitatively analyze the importance and current competency level by each item.

RESULTS AND DISCUSSION

IPA utilized the importance of the evaluated capabilities and current capabilities as X and Y axis, respectively to create a 2-dimensional chart. The analysis result represented which capabilities required management and the result was derived without utilizing a complex statistical method (Duke and Persia, 1996). Martilla and James (1977) recommended on using the average value should both average value and center value are alike. This research utilized the average value and the Fig. 3 represents the values of the survey results.

Quadrant 1 holds the core competencies which needs to be improved immediately as their competency level are low, despite being recognized as an important core competency in the course of project promotion. Nine core competencies were found to be located within this quadrant and they include 4 items from the planning phase, 4 items from the marketing phase and 1 item from the operating phase.

Quadrant 2 holds core competencies of which maintaining current competitive level is important for they are recognized as important core competencies in the course of project promotion. Fourteen core competencies were found to be located in this quadrant which included 6 items from the planning phase, 3 items from the marketing phase and 6 items from the operating phase.

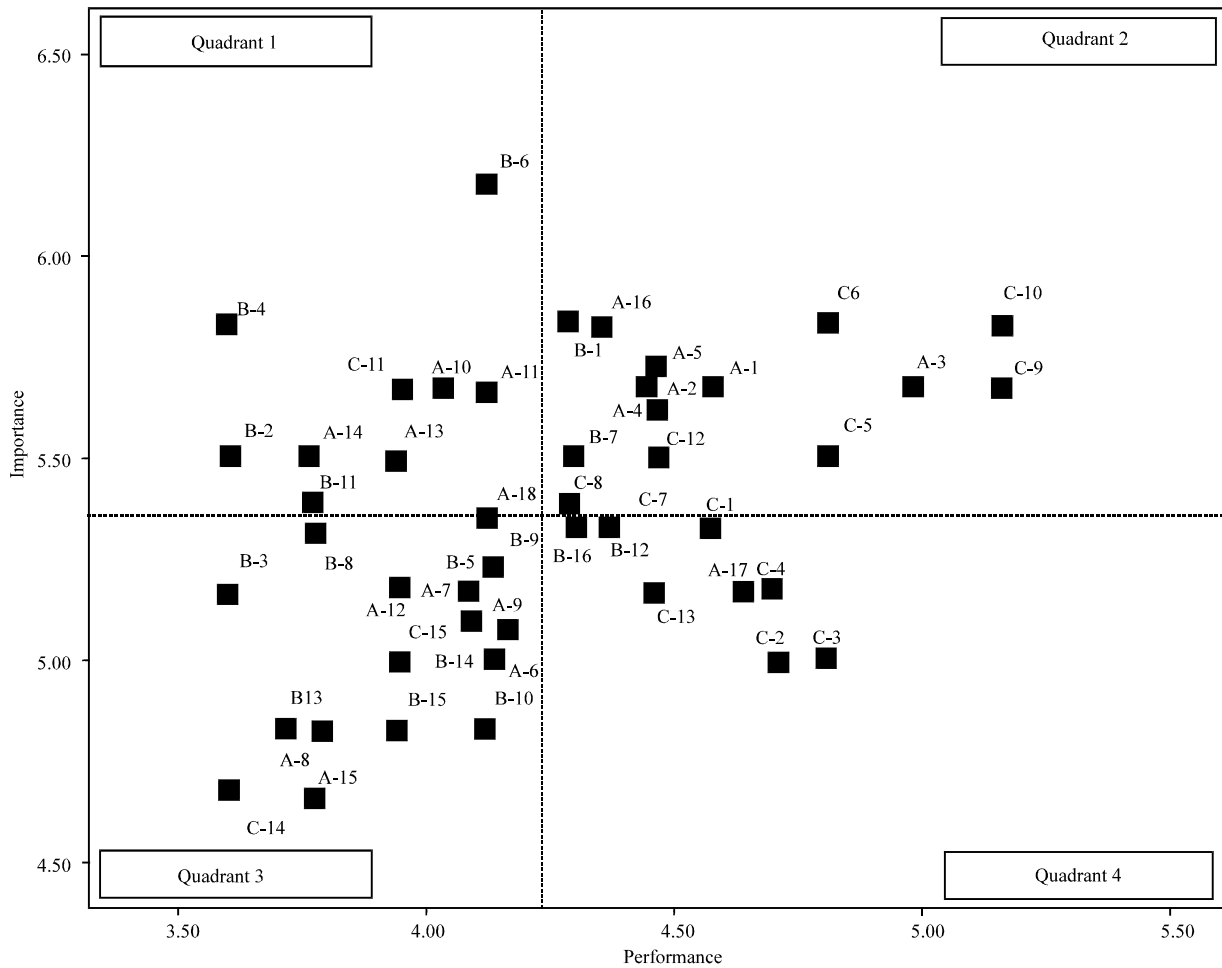


Fig. 3: Distribution of IPA results

Table 3: Gap value results of quadrant 1

Quadrant/Code	Importance	Performance	Gap	Rank
Concentrate here				
B-4	5.83	3.67	2.16	1
B-6	6.17	4.17	2.00	2
B-2	5.50	3.67	1.83	3
A-14	5.50	3.83	1.67	4
C-11	5.67	4.00	1.67	4
A-10	5.67	4.08	1.59	6
B-11	5.37	3.83	1.54	7
A-13	5.50	4.00	1.50	8
A-11	5.67	4.17	1.50	8

Quadrant 3 holds the core competencies which were recognized as unimportant in the course of project promotion and for which competency level is low. They are the competencies which require a strategy that applies only limited resources. Seventeen core competencies were found to be located within this quadrant and they included 7 items from the planning phase, 8 items from the marketing phase and 2 items from the operating

Table 4: Gap value results of quadrant 2

Quadrant/Code	Importance	Performance	Gap	Rank
Keep up the good work				
B-1	5.83	4.33	1.50	1
A-16	5.83	4.39	1.44	2
A-5	5.71	4.50	1.21	3
A-4	5.67	4.48	1.19	4
B-7	5.50	4.33	1.17	5
A-2	5.62	4.50	1.12	6
A-1	5.67	4.61	1.06	7
C-8	5.38	4.33	1.05	8
C-6	5.83	4.83	1.00	9
C-12	5.50	4.50	1.00	9
A-3	5.67	5.00	0.67	11
C-5	5.50	4.83	0.67	11
C-10	5.83	5.17	0.66	13
C-9	5.67	5.17	0.50	14

phase. Quadrant 4 holds the core competencies which were recognized as unimportant in the course of project promotion. However, they are potential core competencies

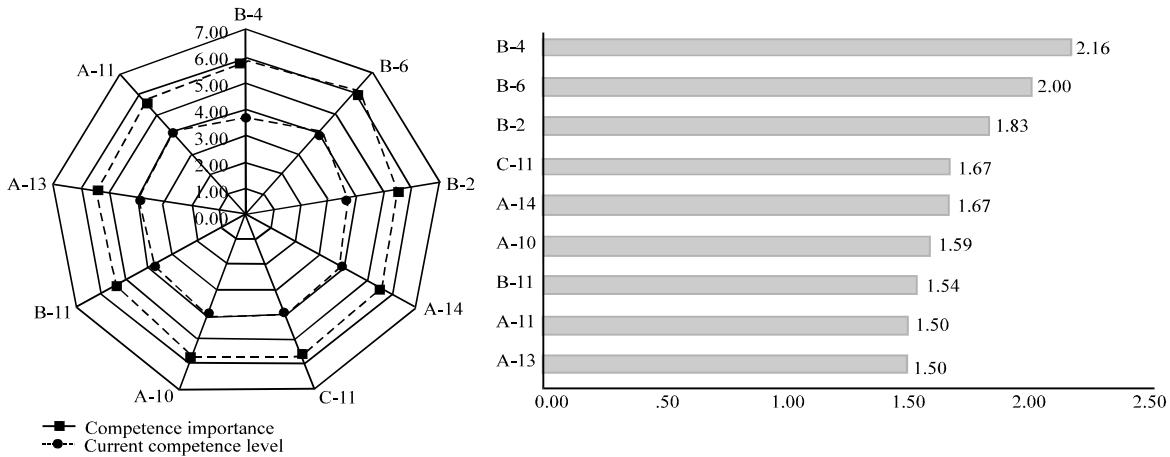


Fig. 4: Gap analysis of quadrant 1; GAP (competence importance, current competence level)

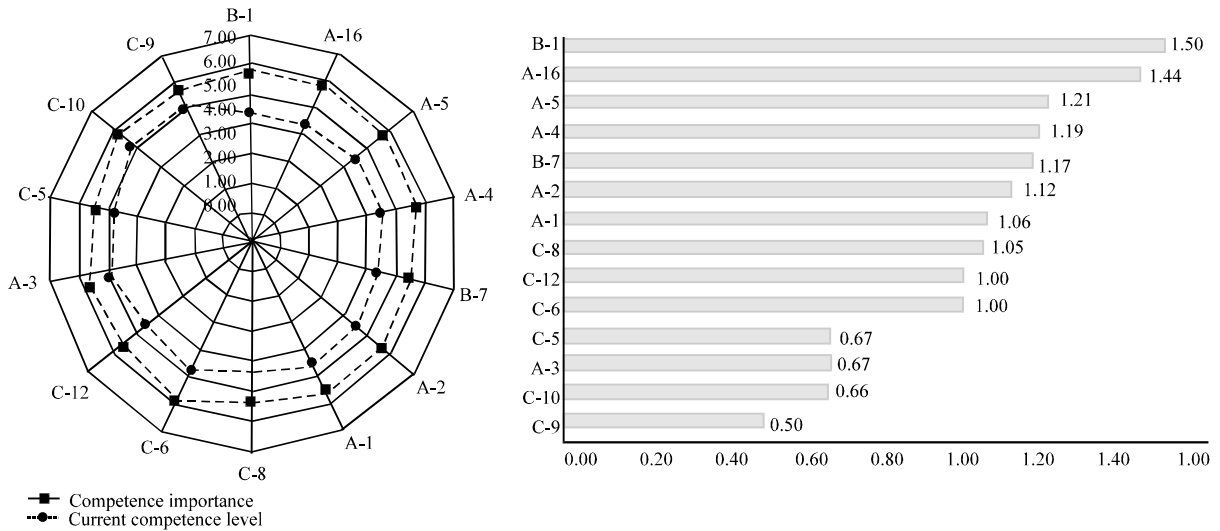


Fig. 5: Gap analysis of quadrant 2; GAP (competence importance, current competence level)

as they have properties that elicit relatively high competency. Nine core competencies were found to be located in this quadrant which included 1 item from the planning phase, 2 items from the marketing phase and 6 items from the operating phase.

This research utilizing the difference between importance and current competency level for each item utilizing gap analysis. As a result of IPA in quadrant 1, 9 core competencies were distributed as shown in Fig. 4. The gap analysis results for the core competencies located in quadrant 1 are listed in Table 3. As the analysis results show, items with relatively high gap differences were: ability to handle risks of the local country (2.17) project financing capability (2.00) and development know-how of the participating company (1.83) from

marketing phase. Those items with relatively low gap differences were: sales and information collecting capability (1.50) whether consistent with economic and development plans of the recipient country (1.50) and currency exchange risk measures (1.54) from planning phase and marketing phase. As quadrant 1 gap analysis result were compared to other quadrants, it was observed that the gap values within quadrant 1 were relatively high. Their current competency levels are low even though their importance of core competency is high. Competency level for each of these core competencies needs to be improved if Korean companies are to secure contract orders and acquire competitiveness in the future. Based upon the IPA results, quadrant 2 contains 14 core competencies as shown in Fig. 5.

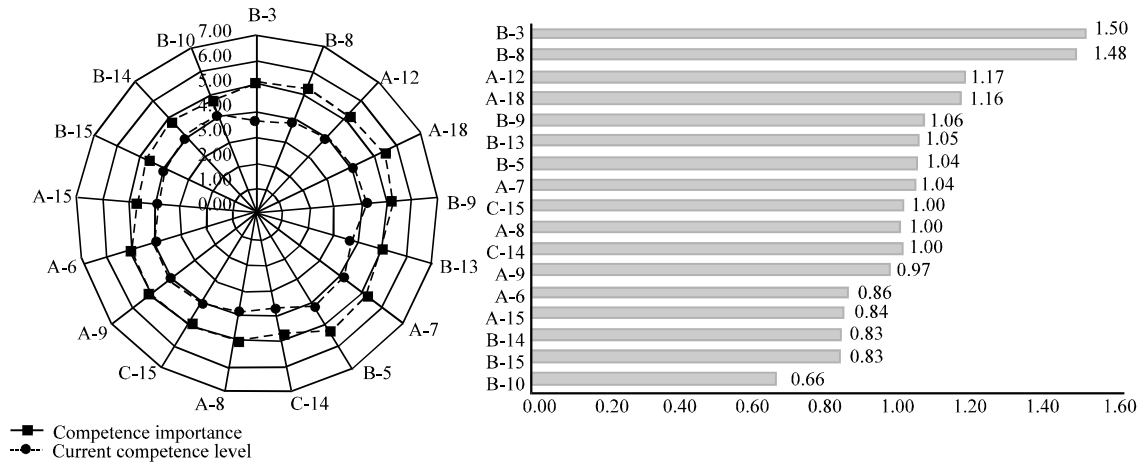


Fig. 6: Gap analysis of quadrant 3; GAP (competence importance, current competence level)

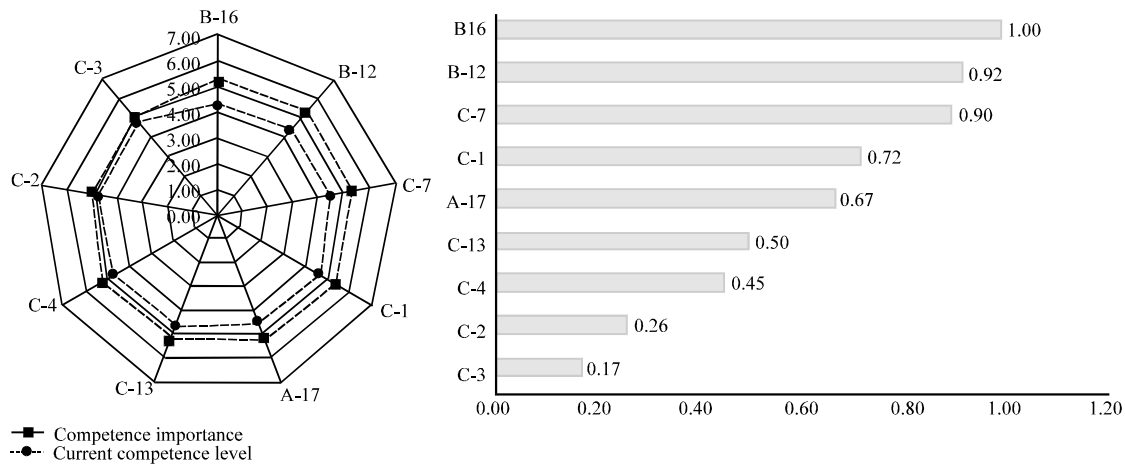


Fig. 7: Gap analysis of quadrant 4; GAP (competence importance, current competence level)

Table 5: Gap value results of quadrant 3

Quadrant/Code	Importance	Performance	Gap	Rank
Low priority				
B-3	5.17	3.67	1.50	1
B-8	5.31	3.83	1.48	2
A-12	5.17	4.00	1.17	3
A-18	5.33	4.17	1.16	3
B-9	5.23	4.17	1.06	5
B-13	4.83	3.78	1.05	6
A-7	5.17	4.13	1.04	7
B-5	5.21	4.17	1.04	7
C-14	4.67	3.67	1.00	9
A-8	4.83	3.83	1.00	9
C-15	5.00	4.00	1.00	9
A-9	5.12	4.15	0.97	12
A-6	5.05	4.19	0.86	13
A-15	4.67	3.83	0.84	14
B-15	4.83	4.00	0.83	15
B-14	5.00	4.17	0.83	15
B-10	4.83	4.17	0.66	17

Table 6: Gap value results of quadrant 4

Quadrant/Code	Importance	Performance	Gap	Rank
Possible overkill				
B-16	5.33	4.33	1.00	1
B-12	5.33	4.41	0.92	2
C-7	5.33	4.43	0.90	3
C-1	5.33	4.61	0.72	4
A-17	5.17	4.50	0.67	5
C-13	5.17	4.67	0.50	6
C-4	5.17	4.72	0.45	7
C-2	5.00	4.74	0.26	8
C-3	5.00	4.83	0.17	9

The gap analysis results for the core competencies located in quadrant 2 are listed in Table 4. Analysis revealed that those items with relatively high gap differences were: export financing and insurance conditions (1.50), project team leader competence (1.44) and field survey and rough feasibility study (1.21) from

planning phase and marketing phase. The items with relatively low gap differences were: quality control capability for the work (0.50), relationship building with ordering country by high level diplomatic activities (0.67) and project management capability (0.67) from planning phase and operating phase. From these analysis results, it can be interpreted that the Korean government's policy to encourage proactive overseas entry as well as competence strengthening in engineering by Korean construction companies had an effect on the core competitive results. The quadrant 3 IPA revealed 17 competitive competence items as shown in Fig. 6.

Results of the gap analysis of the core competencies located in quadrant 3 are listed in Table 5. As the analysis results revealed, those items with relatively high gap differences were: public awareness of the participating company (1.50), human relationship and trust building with persons charged of order placement (1.48), ability to form the private and public cooperative system (1.17) and capability to identify project trend information, survey and planning (1.17) from planning phase and marketing phase. Those items with relatively low gap differences were capacity to accept the contractor's requirements (0.67), assessment on ethical aspects of the participating company (0.83), capability to cope with various order placing methods of the contractor (0.83) and management of construction drawings, procedures and manuals (0.83) from planning phase and operating phase. The quadrant 4 IPA resulted in 9 competitive competence items as shown in Fig. 7.

The gap analysis results for core competencies located in quadrant 4 are listed in Table 6. The analysis results revealed that those items with relatively high gap differences were: whether built cooperative relationship with the contractor (1.00), engineering technical capability of the participating company (0.92) and subcontractors management level (0.90) from the marketing phase and the operating phase those items with relatively low gap differences were material procurement and material management (0.17), design and design management (0.26) and ability to combine technologies and new construction methods (0.45) from the operating phase. Those core competencies located in quadrant 4 can be considered as potential core competencies in the future as the current competency level of the entities under study are high even though the relative importance of the competencies themselves is lower than that of other core competencies. Thus, it can be expected that these items located in this quadrant can be positioned as important items in terms of securing and strengthening core competencies consistently in the future.

Those items revealed by IPA as excellent competencies for Korean companies performing EDCF construction projects were competencies located in quadrant 2. Among them, ability to control quality of work, build relationships with the ordering country by high level diplomatic activities and project management capabilities were very highly assessed. It was discovered that core competencies found to be in quadrant 4 should be secured in the following priority: the ability to handle the risks of the local country, project financing capabilities and ability to develop knowledge of the participating company. Those competencies should be improved as soon as possible.

CONCLUSION

This research surveyed and analyzed the core competencies necessary for Korean construction companies in executing an EDCF project. As such, FGI targeting relevant professionals was conducted as method to extract core competencies which were used to enhance competitiveness in winning orders within the EDCF program. From those results, 49 core competencies for EDCF were derived. Then, by IPA targeting relevant experts, importance and the current competency level by each core competencies item were analyzed. Results of the IPA were then utilized to conduct gap analysis of the core competencies located within each quadrant. This allowed us to verify that current competency levels were low in comparison with importance. Particularly, it was revealed that, it is necessary to strengthen competencies for the ability to handle the risks of the local country, project financing capabilities, the ability development knowledge of the participating company, sales and information collecting capabilities, consistency with economic and development plans of the recipient country and knowledge of currency exchange risk measures. Through analysis, it was determined that Korean construction companies should embark on a course that includes systematic efforts to enhance competency levels for the core competencies. To be successful, companies will need an approach that strategically strengthens competency levels for those competencies where they fall short. The limitations of this study and future study directions to overcome those limitations are as follows: first, supplementation of the qualitative analysis will be needed to handle in depth those parts intractable with survey to working-level employees within companies participating in actual projects and quantitative analysis will be required. Second, in order to secure order winning

competitiveness in the EDCF program consistently in the future, it is apparent that on-going studies are needed to focus on the changing policy of official development assistance program and global basis.

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